

08/777958



12/24/96

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December 24, 1996

Attorney Docket No.: 02103/211002

**BOX PATENT APPLICATION**Commissioner of Patents and Trademarks  
Washington, DC 20231

Presented for filing is a new continuation patent application of:

Applicant: DONALD F. HAMILTON AND MICHAEL D. ROSEN  
Title: VEHICLE TRUNK WOOFEREnclosed are the following papers, including all those required for  
a filing date under 37 CFR §1.53(b):

Pages of Specification	4
Pages of Claims	2
Pages of Abstract	1
Signed Declaration	[To Be Filed At A Later Date]
Sheets of Drawing	3

Under 35 USC §120, this application claims the benefit of prior U.S.  
application 07/871,926, filed April 21, 1992.

Basic filing fee	770.00
Total claims in excess of 20 times \$22.00	0.00
Independent claims in excess of 3 times \$80.00	0.00
Multiple dependent claims	0.00
Total filing fee:	\$ 770.00

A check for the filing fee is enclosed. Please charge any other  
required fees, or apply any credits, to Deposit Account No. 06-1050, referencing  
the Attorney Docket number shown above.If this application is found to be INCOMPLETE, or if it appears that  
a telephone conference would helpfully advance prosecution, please telephone the  
undersigned at 617/542-5070.

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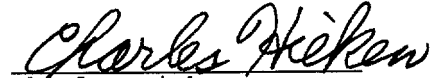
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FISH & RICHARDSON P.C.

BOX PATENT APPLICATION  
December 24, 1996  
Page 2

Kindly acknowledge receipt of this application by returning the enclosed postcard.

Respectfully submitted,  
FISH & RICHARDSON P.C.

  
Charles Hieken  
Reg. No. 18,411

Enclosures



67479 U.S. PTO

08/777958



12/24/96

**APPLICATION**  
**FOR**  
**UNITED STATES LETTERS PATENT**

**TITLE:** VEHICLE TRUNK WOOFER

**APPLICANT:** **DONALD F. HAMILTON AND MICHAEL D. ROSEN**

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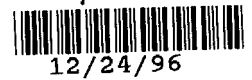
Sam Wiener

Sam Wiener



67479 U.S. PTO

08/777958



ATTORNEY DOCKET NO: 02103/211002

VEHICLE TRUNK WOOFER

This is a continuing application of Application Serial No. 07/871,926 filed April 21, 1992.

5           The invention relates to audio speakers for automobiles. More particularly, the invention relates to the placement of a low frequency audio speaker to effect improved frequency response in the interior of the vehicle with a trunk speaker that occupies negligible useful trunk volume.

10           It has been known in the automobile speaker art to mount a speaker having low frequency response in a hole formed in the rear deck (package shelf) of the vehicle. However, this prior art configuration has the disadvantage that, in the front seat, a "hole" is usually experienced in the frequency  
15           response between 60-80 Hertz. This prior art configuration also has the disadvantage that, in the rear seat, an undesirable peak in the frequency response is usually experienced between 80-100 Hertz. The prior art configuration has the further disadvantage that; the speakers mounted in the  
20           rear deck reduce the calculated trunk volume of the vehicle.

          According to the invention at least one low frequency response speaker is within the trunk of the vehicle, above the trunk floor and outside any compartment containing a spare tire, preferably in a lower rear corner, but not attached to  
25           the rear deck and without speaker holes being cut in the rear deck.

          Other features, objects and advantages will become apparent from the following detailed description when read in connection with the accompanying drawings in which:

30           FIG. 1 is a rear three-quarter view of an automobile showing speaker placement according to an exemplary embodiment of the invention;

          FIG. 2 is a rear view of an automobile showing speaker placement in accordance with the embodiment of FIG. 1;

FIG. 3 is a graph showing a comparison between front seat frequency response according to the present invention and front seat frequency response obtained using the prior art arrangement;

5        FIG. 4 is a graph showing a comparison between rear seat frequency response according to the present invention with the frequency response obtained using the prior art arrangement; and

10        FIGS. 5 and 6 are top views and FIG. 7 is a rear view of a trunk helpful in understanding the useful trunk volume.

15        With reference now to the drawings and more particularly FIG. 1, a speaker enclosure 9 is placed in a rearward section of the trunk 7 of the vehicle 1 above the trunk floor 8 and outside any compartment containing the spare tire. The speaker enclosure 9 is not, however, mounted to the rear deck 3 nor are speaker holes provided in the rear deck. As shown in the rear view of FIG. 2, placement of the speaker enclosure 9 is preferably in a corner of the vehicle trunk 7 (here the left corner) occupying negligible useful trunk  
20        volume.

25        The speaker configuration of the invention has numerous advantages over the prior art. Since the invention does not require holes to be cut in the rear deck, transmission of road noise into the passenger compartment is reduced. The package shelf does not, however, affect low frequencies (+/- 1dB), and the trunk as a whole acts as a natural low-pass filter. Also, because of the way auto manufacturers calculate useful trunk volume, the enclosure in the corner of the trunk results in a smaller decrease in  
30        calculated useful trunk volume than do speakers mounted in the rear deck.

When calculating trunk's volume, manufacturers neglect to count volumes that are (1) behind cosmetic panels

identified as cosmetic trim in the top view of a trunk in FIG. 5, (2) before cosmetic trim but that are small or odd shaped, making the use of that space for storage of a suitcase or box nearly impossible, such as identified as negligible volume in the top view of a trunk in FIG. 6, and (3) around items which protrude into the trunk, such as speakers attached to the rear decks as shown in the rear view of a trunk in FIG. 7. The reference to negligible useful trunk volume means that the enclosure portion in the useful trunk volume is a small percentage of the useful trunk volume.

The frequency response of the configuration according to the invention is greatly superior to that obtained with the prior art. Using deck-mounted speakers, a "hole" in frequency response is normally experienced in the front seat between 60-80 Hertz. The graph of FIG. 3, which is a comparison between the front seat frequency response using deck-mounted speakers and the speaker arrangement of the invention, clearly shows that the hole between 60 and 80 Hertz is substantially eliminated. Similarly, using conventional deck-mounted speakers a peak in frequency response is usually encountered in the rear seat between 80 and 100 Hertz. Referring to FIG. 4, which is a comparison between rear seat frequency response of deck-mounted speakers and rear seat response using the configuration of the invention, the peak between 80-100 Hertz is substantially eliminated.

While the speaker is shown mounted in an enclosure according to the preferred embodiment, the speaker could be mounted in the trunk without a separate enclosure. Also, although the enclosure is shown mounted in the left corner of the trunk, any rear remote area of the trunk would be acceptable for the purposes of the invention.

While there are shown and described present embodiments of the invention, it is to be distinctly

understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

CLAIMS

1           1. An audio speaker system for a vehicle having a  
2 passenger compartment, a spare tire compartment, a trunk  
3 having a trunk floor, a dividing portion and a rear deck, said  
4 dividing portion and said rear deck dividing the trunk and the  
5 passenger compartment, said audio speaker system comprising at  
6 least one low frequency speaker disposed within the trunk of  
7 the vehicle at the trunk rear in a location spaced from the  
8 passenger compartment by the portion of the trunk extending to  
9 the front of said vehicle such that said at least one speaker  
10 is clear of the rear deck above said trunk floor and outside  
11 said spare tire compartment.

1           2. An audio speaker system in accordance with claim  
2 1, wherein said at least one speaker is disposed in a rearward  
3 section of the trunk occupying negligible useful trunk volume  
4 to cause a smaller decrease in calculated trunk volume than  
5 would occur with said one speaker mounted in said rear deck.

1           3. An audio speaker system in accordance with claim  
2 2, wherein said at least one speaker is disposed in a rear  
3 trunk corner at the rear of said vehicle.

1           4. An audio speaker system in accordance with claim  
2 1, wherein said at least one speaker is mounted in an  
3 enclosure.

1           5. An audio speaker system in accordance with claim  
2 1, wherein said vehicle is characterized by a front seat  
3 frequency response and a rear seat frequency response  
4 constructed and arranged to be free of an undesirable peak in  
5 the rear seat frequency response of said vehicle between 80-



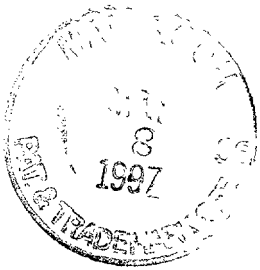
- 6 -

6 100 Hz and free of an undesirable hole between 60-80 Hz in the  
7 front seat frequency response of said vehicle.

## VEHICLE TRUNK WOOFER

### Abstract of the Disclosure

A vehicle trunk woofer is a low frequency speaker disposed within the trunk of a vehicle so as to be separated from the vehicle passenger compartment by a dividing portion and a rear deck. The dividing portion may be a fixed element or a movable element, such as a fold down rear seat. The speaker mounted in the trunk may be mounted in an enclosure and may be mounted adjacent to the dividing portion, but is not mounted to the rear deck.



PATENT

ATTORNEY DOCKET NO. 02103/211002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Donald F. Hamilton et al.      Art Unit: 2605  
Serial No.: 08/777,958      Examiner:  
Filed : December 24, 1996  
Title : VEHICLE TRUNK WOOFER

Assistant Commissioner of Patents  
Washington, DC 20231

POWER OF ATTORNEY AND ELECTION OF ASSIGNEE TO CONDUCT PROSECUTION

The undersigned, the owner of the entire right, title and interest in the above-identified application filed herewith, elects to exclusively conduct the prosecution of this application in accordance with the provisions of 37 C.F.R. § 3.71 and appoints as attorney of the undersigned

Charles Hieken  
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Reg. No. 18,411

to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith with full powers of substitution. Please send all correspondence and direct all telephone calls to the above attorney at the above address, telephone number and facsimile number.

Bose Corporation

Date: April 24, 1997

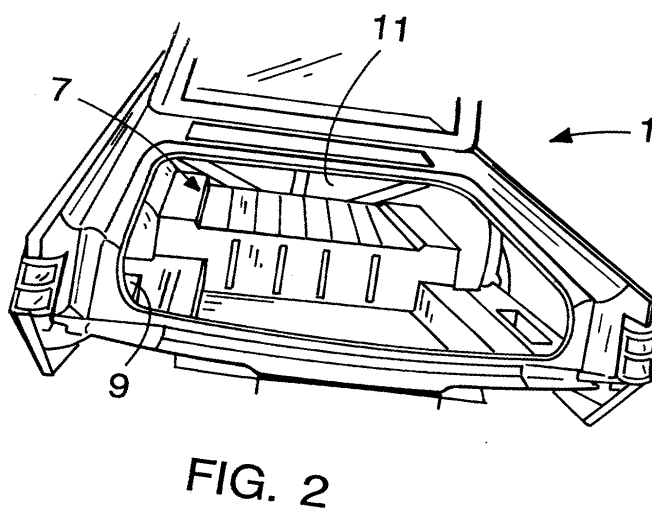
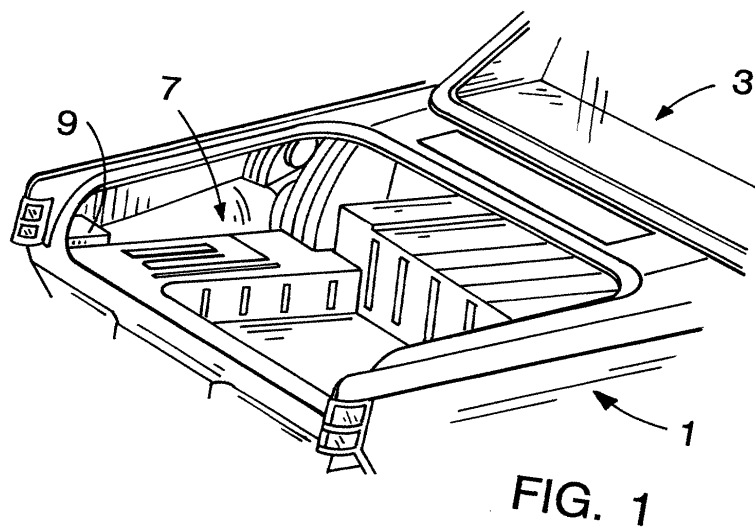
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Charles Hieken



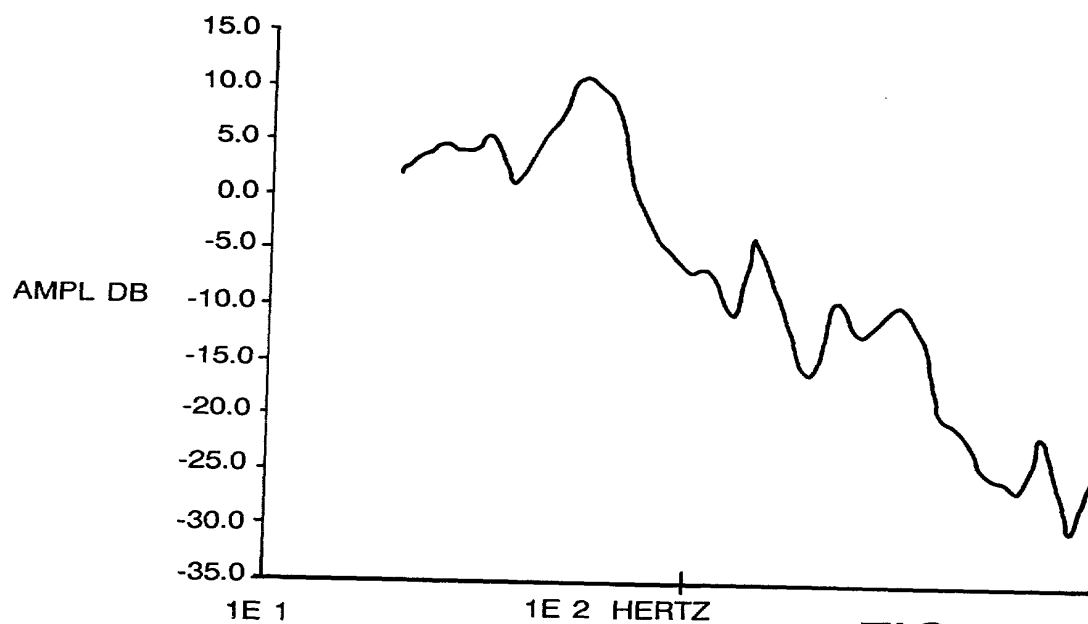


FIG. 3

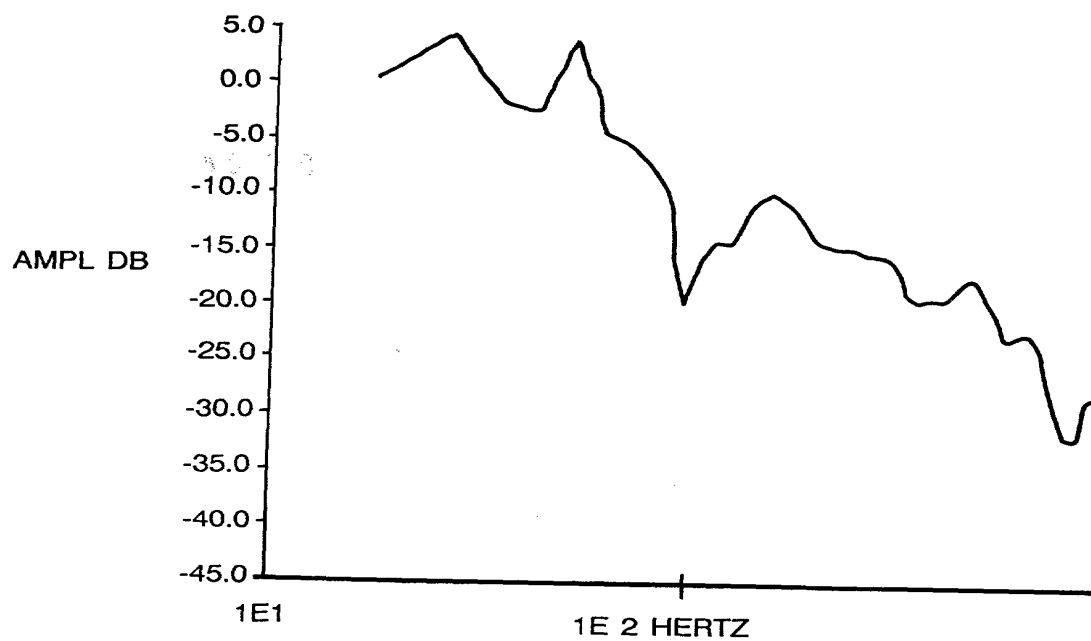


FIG. 4

NEGLEGIBLE SPACE

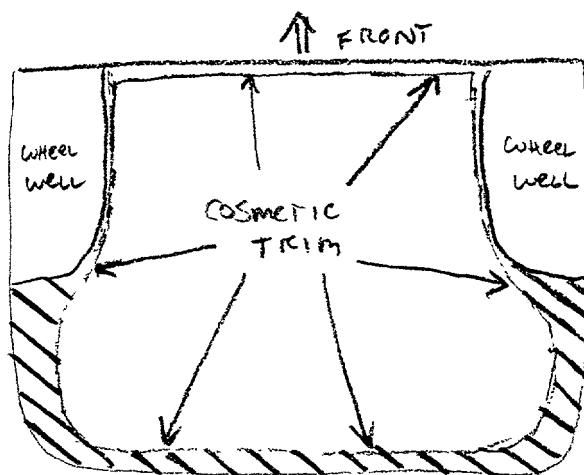


FIG. 5

TOP VIEW OF TRUNK

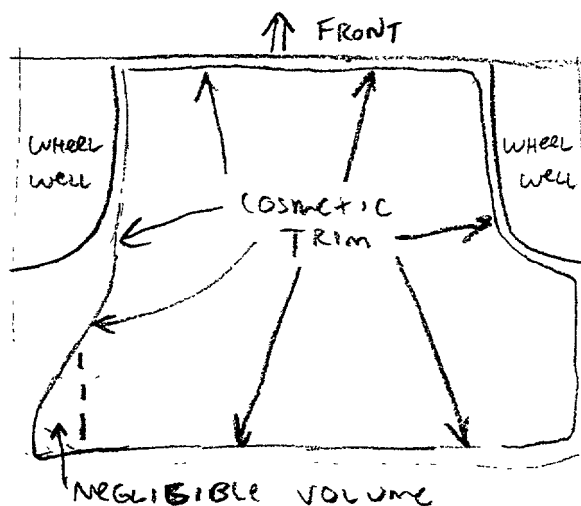
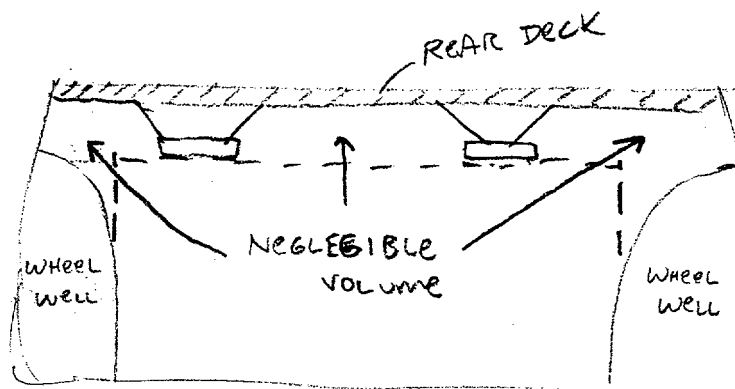


FIG. 6

TOP VIEW OF TRUNK



REAR  
SIDE VIEW OF TRUNK

FIG. 7

08/777958

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled VEHICLE TRUNK WOOFER, the specification of which

☐ is attached hereto.

☒ was filed on December 24, 1996 as Application Serial No. 08/777,958

and was amended on \_\_\_\_\_.

☐ was described and claimed in PCT International Application No. \_\_\_\_\_  
filed on \_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information I know to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. SERIAL NO.	FILING DATE	STATUS
<u>07/871,926</u>	<u>April 21, 1992</u>	<input checked="" type="checkbox"/> Pending <input type="checkbox"/> Issued <input type="checkbox"/> Abandoned

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Charles Hieken, Reg. No. 18,411

Address all telephone calls to Charles Hieken at telephone number 617/542-5070.

Address all correspondence to Charles Hieken, Fish & Richardson P.C., 225 Franklin Street, Boston, MA 02110-2804.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full Name of Inventor: Donald F. Hamilton FOO

Inventor's Signature: [Signature] Date: 4/24/97

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Full Name of Inventor: Michael D. Rosen 2-06

Inventor's Signature: [Signature] Date: 7/30/94

Residence Address: Auburndale, Massachusetts 02166 MA

Citizen of: U.S.A.

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[illegible]